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multiplexed by primary terminal 100 and controls decoding of the compressed data by decoding circuit 166. By using this system, the viewer is charged corresponding to the reception status of the pay-per-view program at the primary terminal. Also, the video signals are scrambled between the primary and secondary terminals, and charging is further checked at the secondary terminal so that improper reception can be prevented.

Selected figure: Figure 1

[Attached amendments have been incorporated into the text of the translation.]

Claims [amended]

1. An information recording/reproducing device that records encrypted information on a recording medium and reproduces it from that recording medium, characterized by having a recording/reproducing means that records said encrypted information on said recording medium and reproduces it from said recording medium,

a decoding means that decodes the encrypted information reproduced by said recording/reproducing means, and

an output means that performs a copy guard processing on the information decoded by said decoding means and outputs the information.

2. The information recording/reproducing device cited in Claim 1, characterized by the fact that decoding in said decoding means is possible only when said decoded information is recorded by a specific device.

3. The information recording/reproducing device cited in Claim 1, characterized by the fact that decoding in said decoding means is possible only when said decoded information is recorded by this information recording/reproducing device.

4. The information recording/reproducing device cited in Claim 1, characterized by the fact that said information is a video signal, and said copy guard processing is performed to the synchronization signal part of the video signal.

5. An information recording/reproducing method that records encrypted information on a recording medium and reproduces it from that recording medium, characterized by the following facts:

during recording, said encrypted information is recorded on said recording medium;
during reproduction, the information reproduced from said recording medium is decoded;
after a copy guard processing is performed on the decoded information, it is output.

6. The information recording/reproducing method cited in Claim 5, characterized by the fact that decoding in said decoding means is possible only when said decoded information is recorded by a specific device.

7. The information recording/reproducing method cited in Claim 5, characterized by the fact that decoding in said decoding means is possible only when said decoded information is recorded by an appropriate information recording/reproducing device.

8. The information recording/reproducing method cited in Claim 5, characterized by the fact that said information is a video signal, and said copy guard processing is performed to the synchronization signal part of the video signal.

9. An information recording/reproducing device that records/reproduces first information encrypted by a first encryption and the key information used for decoding the first information on a recording medium, characterized by having

an encryption means that performs a second encryption on said key information to generate second information,

a recording/reproducing means that records said encrypted first information and said second information on said recording medium and reproduces them from that recording medium,

a first decoding means that decodes the second information reproduced by said recording/reproducing means corresponding to said second encryption,

a second decoding means that uses said key information decoded by the first decoding means to decode said encrypted first information, and

an output means that performs a copy guard processing to the first information decoded by the second decoding means and outputs the information.

10. The information recording/reproducing device cited in Claim 9, characterized by the fact that said information is a video signal, and said copy guard processing is performed on the synchronization signal part of the video signal.

11. An information recording/reproducing method that records/reproduces first information encrypted by a first encryption and the key information used for decoding the first information on a recording medium, characterized by the following facts:

during recording, a second encryption is performed on said key information to generate second information, and said encrypted first information and the second information are recorded on said recording medium;

during reproduction, the second information reproduced from said recording medium is decoded corresponding to said second encryption to generate said key information;

the decoded key information is used to decode said encrypted first information;

a copy guard processing is performed to the decoded first information, and the information is output.

12. The information recording/reproducing method cited in Claim 11, characterized by the fact that said information is a video signal, and said copy guard processing is performed on the synchronization signal part of the video signal.

13. An information reproducing device that reproduces encrypted information from a recording medium, characterized by having

a reproducing means that reproduces said encrypted information from said recording medium,

a decoding means that decodes the encrypted information reproduced by said reproducing means, and

an output means that performs a copy guard processing to the information decoded by said decoding means and outputs the information.

14. The information reproducing device cited in Claim 13, characterized by the fact that said information is a video signal, and said copy guard processing is performed on the synchronization signal part of the video signal.

15. An information reproducing method that reproduces encrypted information from a recording medium, characterized by the following facts:

said encrypted information is reproduced from said recording medium,

the reproduced encrypted information is decoded;

a copy guard processing is performed on the decoded information, and the information is output.

16. The information reproducing method cited in Claim 15, characterized by the fact that said information is a video signal, and said copy guard processing is performed on the synchronization signal part of the video signal.

Detailed explanation of the invention

[0001] [amended]

Industrial application field

The present invention relates to an information recording/reproducing device and method used for appropriately recording/reproducing video signals or other information in a multi-channel program communication service that performs, for example, program request, home shopping, or the like by using a bi-directional communication cable, terrestrial signals, satellite signals, a telephone line, or the like.

[0002]

Prior art

In recent years, in addition to a conventional terrestrial broadcast that transmits programs to each family using the VHF band and UHF band radio signals, cable broadcasting has become more and more popular. In this case, a coaxial cable, optical fiber, and other fibers are laid from a relay station to each family, and these cables are used to directly transmit programs. In particular, since it has recently become possible to broadcast programs by using a communication satellite, broadcasting satellite, and the like, many cable broadcasting companies that can provide multi-channel service have been established.

[0003]

In company with the development of optical fiber technology, digital transmission technology, and highly-efficient encoding technology, communication services for home shopping or the entertainment program distribution system known as the VideoOnDemand (referred to as VOD hereinafter) system, which can replace video rental and allows the user to watch a preferred program at a preferred time depending on a program request using a bi-directional communication cable, are being studied.

[0004]

Since these cable broadcasting and VOD systems transmit video signals by means of wired communication using a coaxial cable or the like, ghost and other radio disturbances in a program broadcast using conventional terrestrial waves can be avoided. It is also possible to take advantage of the independent broadcasting of a program distribution company in addition to the retransmitted programs of normal program broadcasting distributed using terrestrial waves.

[0005]

Problems to be solved by the invention

Each viewer signs a contract with a cable broadcasting company, VOD or other service provider, and a special reception terminal is connected to the TV or other video signal display device of the viewer. In this way, the viewer can watch without interfering with a retransmitted program of terrestrial broadcasting distributed by the cable broadcasting company or service provider. The user can also watch movies, various kinds of sports games, music programs, and other independent broadcasts provided by the cable broadcasting company or service provider or satellite broadcasting even if the user does not possess special equipment other than a special terminal for receiving cable broadcasts. In addition, the user can record and store the distributed

programs by connecting a VTR or other video signal recording/reproducing device to the special terminal.

[0006]

On the other hand, a service provider broadcasts programs only to viewers who have signed reception contracts. Therefore, the service provider hopes that the programs are only watched by subscribed viewers from whom viewing fees can be collected. In other words, systems that allow non-subscribers to improperly watch the programs distributed by the service provider are undesired. In the conventional system, however, the video signals output from the special reception terminal that receives the programs distributed from a service provider are plain signals. Although programs cannot be received without using a special terminal, it is possible to use a VTR or the like to copy programs received by a special terminal. When a duplicated tape is transferred to a third party, the third party who does not have a special terminal can also easily watch the distributed programs. In other words, non-subscribers cannot be prevented from watching programs improperly. If frequent improper reception occurs due to copying of distributed programs, the benefits of the program distribution companies and the copyrights of the programs will be seriously affected.

[0007]

The objective of the present invention is to provide a system that can prevent the benefits of the copyright owners from being affected or reduced by improper duplication of distributed programs and can reliably charge the fees of pay-per-view programs to subscribers without delay.

[0008] [amended]

Means for solving the problem

In order to achieve the aforementioned objective, the present invention provides an information recording/reproducing device comprising a recording/reproducing means that records encrypted information on a recording medium and reproduces it from said recording medium, a decoding means that decodes the encrypted information reproduced by said recording/reproducing means, and an output means that performs a copy guard processing on the information decoded by said decoding means and outputs the information. The present invention also provides an information reproducing device comprising a reproducing means that reproduces encrypted information from a recording medium, a decoding means that decodes the encrypted information reproduced by said reproducing means, and an output means that

performs a copy guard processing of the information decoded by said decoding means and outputs the information.

[0009] [amended]

The present invention provides an information recording/reproducing method. According to this method, during recording, encrypted information is recorded on a recording medium. During reproduction, the information reproduced from said recording medium is decoded. After a copy guard processing is performed on the decoded information, it is output. The present invention also provides an information reproducing method. According to this method, encrypted information is reproduced from a recording medium. The reproduced encrypted information is decoded. A copy guard processing is performed on the decoded information, and the information is output.

[0010] [amended]

Operation

By using this system, it is possible to prevent improper watching of a distributed program by a non-subscriber or a subscriber who does not receive the distributed program himself (or herself). That is, it is possible to protect the benefits of the program distribution companies and the copyrights of the programs.

[0011]

[deleted by amendment]

[0012]

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[0013]

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[0014]

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[0015]

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[0016]

Application examples

In the following, an application example of the present invention will be explained based on figures.

[0017]

Figure 1 shows an example of using the system disclosed in the present invention to display programs transmitted by means of cable broadcasting. (A), (B) in the figure represent a primary terminal and a secondary terminal, respectively.

[0018]

Before explaining Figure 1, Figure 6 will be used to briefly explain a cable broadcasting system. In Figure 6, 600 represents a program distribution company that makes and distributes pay-per-view programs. 610 represents a communication satellite (or broadcasting satellite). 620 represents a cable broadcasting relay station. 630 represents a coaxial cable, optical fiber, or other communication cable that directly connects a relay station to each family. 641, 642, 643, and 644 represent subscribing families having special terminals for receiving a cable broadcast.

[0019]

In a cable broadcasting system, the distributed programs are first sent from program provider 600 to relay station 620 via communication satellite (or broadcasting satellite) 610 or using terrestrial waves. In relay station 620, the video signals sent from the program provider are received by a highly sensitive large-scale antenna. Since a special highly sensitive large-scale antenna is used to receive the video signals in said relay station 620, serious signal deterioration or other radio disturbances will not occur. Relay station 620 uses cable 630 to send the received video signals to the cable broadcasting reception terminal shown in Figure 1 set up in each of subscribing families 641-644.

[0020]

An example of the data structure of the video signals sent from the relay station to each subscribing family will be explained based on Figure 2.

[0021]

Figure 2 shows an example of digitally transmitted data sent from a relay station in the present invention. In Figure 2, 200 represents a header part including the program information having various kinds of information of the program to send and the key signal needed for

decoding the compressed video data. 211, 212 represent the compressed video data parts. 221, 222 represent the parity parts for error checking used for confirming whether the video signals are correctly received at the terminal of the transmission destination.

[0022]

In this application example, as an example, the data head part comprises n bytes, the compressed video data part comprises m bytes, and the parity part comprises l bytes. In this case, n , m , and l are any natural numbers. n comprises digital data of about several bytes to tens of bytes. m comprises digital data of about several hundred bytes to several thousand bytes. l comprises digital data of about several bytes. Also, as far as timing is concerned, data header part 200 is transmitted first. Then, the compressed video data part and the parity part are transmitted alternately until the end of the program. That is, transmission is in the order of 211, 221, 212, 222, ... If reception from the middle of a program is under consideration, it is desired to not only set the data header part at the beginning of the video signals but also to repeatedly insert it at a prescribed time interval.

[0023]

In Figure 1, 100 represents a primary terminal that receives the distributed program transmitted from the relay station. 101 represents an input terminal that inputs the video signals sent from the relay station to the primary terminal. 102 represents an output terminal that outputs the charging information of the program subscription fee at primary terminal 100. 103 represents an output terminal that outputs the video signals scrambled in primary terminal 100. 111 represents a demodulating circuit that digitally demodulates the video signals input from input terminal 101. 112 represents a separating circuit that separates the data header including the program information and the key signal needed for decoding the compressed video data from the video signals digitally demodulated by demodulating circuit 111. 113 represents an error checker used for checking whether the video signals transmitted from the relay station are correctly received. 114 represents a charger that forms the charging information of the program subscription fee based on the program information separated by separating circuit 112 and the result from checking the received signals by error checker 113. 115 represents a memory that stores the intrinsic identification code of the terminal that can identify primary terminal 100 or the subscriber having primary terminal 100. 116 represents a scrambler that performs encryption by superimposing the key signal separated by separating circuit 112 with the terminal identification code stored in memory 115. 117 represents a multiplexing circuit that can multiplex the compressed video data output from error checker 113 with the key information output from scrambler 116 on the time axis.

[0024]

Also, 150 represents a secondary terminal paired with primary terminal 100. 151 represents an input terminal that inputs the video signals scrambled in the primary terminal. 161 represents an extracting circuit that extracts the key information from the input video signals. 162 represents a descrambler that descrambles the key information extracted by extracting circuit 161 and separates the superimposed key for decoding and the intrinsic terminal identification code of the primary terminal. 163 represents a memory that stores the terminal identification code of the primary terminal paired with secondary terminal 150, that is, primary terminal 100. 164 represents a comparator that compares the terminal identification code separated by descrambler 162 with the terminal identification code stored in memory 163. 165 represents a switch that inputs the decoding key output from descrambler 162 and controls the output corresponding to the output of comparator 164. 166 represents a decoding circuit that uses the decoding key output from switch 165 to decode the compressed video signals. 167 represents a D/A converter that converts the decoded digital video signals into analog signals. 168 represents a monitor that displays the program picture converted into analog signals.

[0025]

The video signals transmitted from relay station 620 through cable 630 shown in Figure 6 are input into the input terminal 101 of primary terminal 100 shown in Figure 1(A). The video signals input to input terminal 101 are first input into demodulating circuit 111. The signals are output after they are digitally demodulated. The video signals output from demodulating circuit 111 are then input into separating circuit 112, which separates the data header of the video signals, that is, data head part 200 shown in Figure 2. The compressed video data and the parity are output to error checker 113. The decoding key included in the data header part is output to scrambler 116. The charging information is output to charger 114.

[0026]

The compressed video data and the parity are then input into error checker 113, where checking occurs regarding whether the compressed video data are correctly received. In this application example, as an example, CRC codes are used for parity parts 221, 222 shown in Figure 2 to perform error checking. That is, before the video data are transmitted to the side of the relay station, a specific algorithm is used to conduct an arithmetic operation on the compressed video data. The obtained code for error checking is added as parity to the compressed video data, which are then transmitted. On the other hand, on the side of the reception terminal, that is, primary terminal 100, the received compressed video data are treated

by using the same algorithm as that used on the transmission side. The result is compared with the parity. If the operation result is equal to the parity, it means that the compressed video data have been correctly transmitted and received. The codes for error checking needed in this error checker 113 are not limited to CRC codes but can also be Reed Solomon codes, simple parity codes, BCH codes, or the like. It is also possible to correct minor transmission errors by using these error correcting codes.

[0027]

The result of error checking obtained using CRC codes or the like is output from error checker 113 and is input along with the program information output from separating circuit 112 into charger 114. Said charger 114 forms the charging information of the subscription fee with respect to the subscriber based on the error information output from error checker 113 and the program information added to the received video signals. For example, when the program name, program category, name of the producing company, name of the copyright owner, and the like are included in the program information, the subscription fee is varied depending on the program category, such as news or a movie. In the case of a VOD service or the like, the subscription fee and the service charge are paid smoothly from the subscriber to the producing company or copyright owner. On the other hand, if error information is used, it is possible to provide a service corresponding to the reception status of the subscriber. For example, the subscription fee can be reduced or exempted completely corresponding to the status of the communication path, for example, when there are a lot of transmission errors that affect program viewing. If a transmission error occurs, it is also possible to send the error information to the relay station to promote retransmission of the video signals in the error part. Said error checker 113 can also be omitted if an error-free communication path, that is, a communication path having no data transmission error, is used.

[0028]

The charging information formed by charger 114 is output from output terminal 102 and is sent to the relay station or cable broadcasting company via a telephone line or other special line or cable. It is also connected to the input terminal 101 of primary terminal 100. If the transmission cable for receiving the video signals is capable of bi-directional communication, it can also be used for sending the charging information. In this case, input terminal 101 is changed to an input/output terminal, and the output of charger 114 can be output from the input/output terminal. In this case, the number of communication cables used for connecting the relay station to each family can be reduced. It is also possible to easily handle a bi-directional communication

service, such as a program request of a VOD system. In addition, ratings can be investigated correctly depending on reception checking of the programs.

[0029]

While the charging information is formed in charger 114, the key signal used for decoding the video signals output from separating circuit 112 is input into scrambler 116. Scrambler 116 scrambles the input key signal and multiplexes the intrinsic terminal identification code of primary terminal 100 stored in memory 115. In this case, the terminal identification code can use a binary number. In this case, although it is most preferable to assign a different value to each of the existing terminals, in fact, it is possible to almost prevent repetition of a terminal identification number by using a binary number having about 10-20 bits.

[0030]

The key information scrambled and superimposed with the terminal identification code in scrambler 116 is input along with the compressed video data into multiplexing circuit 117, wherein the compressed video data are multiplexed with the key information on the time axis. The result is output from output terminal 103.

[0031]

Figure 3 shows a simple structural example of the signal obtained by multiplexing the key information and the compressed video data on the time axis. In this figure, 301 represents each key information item. 311, 312, and 313 represent compressed video signals. In the structural example shown in Figure 3, the case when the signals are recorded on a recording medium of a VTR or the like and reproduction is started from the middle of a program on a magnetic tape is also considered. Key information 301 is repeatedly inserted at a prescribed time interval, more specifically, at least once every 5 min and, preferably, at a higher frequency if possible. In this way, even if reproduction is started in the middle of compressed video data 312 on the magnetic tape, although compressed video data 312 cannot be decoded since there is no key information, the video signals can be decoded from compressed video data 313. If the video signal recording/reproducing device that is used is a laser disc, magneto-optical disc, hard disk, or other random accessible video signal storage device, it is possible to perform reproduction from the middle of a program even if key information 301 is only inserted at one place. In this case, however, in consideration of the fact that errors occur on the recording medium, it is desirable to record key information 301 at least at two places.

[0032]

The signal output from the output terminal 103 of primary terminal 100 shown in Figure 1(A) is input directly or via a VTR or other video signal recording/reproducing device into the input terminal 151 of secondary terminal 150 shown in Figure 1(B). The input signals are separated into the compressed video data and the key signal in extracting circuit 161. The scrambling applied in the primary terminal to the key signal is then removed in descrambler 162. The decoding key is output to switch 165, and the terminal identification code added in the primary terminal is output to comparator 164.

[0033]

It is stored in memory 163 at one input terminal of comparator 164. The preset terminal identification code is input into the secondary terminal, and its content is compared. As described above, each group of terminals has an intrinsic terminal identification code, and the primary terminal and the secondary terminal that form a pair have the same code. Consequently, by comparing the terminal identification code sent from the primary side with the terminal identification code of the secondary side in comparator 164, it is possible to determine whether the compressed video data input to input terminal 151 are received by the primary terminal that pairs with the secondary terminal 150, that is, primary terminal 100.

[0034]

The result of comparing the terminal ID codes in comparator 164 is output to switch 165. The key signal used for decoding the compressed video signals output from descrambler 162 is controlled by switch 165 corresponding to the output result of comparator 164. That is, based on the comparison result obtained from comparator 164, switch 165 outputs the decoding key to decoding circuit 166 if the terminal identification codes are the same and does not output the decoding key if the terminal identification codes are different.

[0035]

The compressed video data separated from the key information by separating circuit 161 are input into decoding circuit 166. In decoding circuit 166, the compressed video data are decoded by using the decoding key input from switch 165. However, if the comparison result obtained from comparator 164 indicates that the terminal identification codes are different, since no decoding key is output from switch 165, the compressed video data cannot be decoded in decoding circuit 166. That is, video signals other than those received by primary terminal 100 paired with said secondary terminal 150 cannot be decoded in decoding circuit 166.

[0036]

The decoded video signals output from decoding circuit 166 are converted into analog signals in D/A converter 167. The picture is displayed on monitor 168. Since video signals that cannot be decoded by decoding circuit 166 cannot properly display their picture on monitor 168, it is impossible to watch the pictures of the program.

[0037]

As described above, when the system of the present invention is used to receive a pay-per-view broadcast, it is possible to charge the pay-per-view subscription fee instantly to the viewer and prevent other subscribers from improperly watching the pay-per-view program.

[0038]

In the following, another application example of the present invention will be explained based on Figure 4.

[0039]

Figure 4 is a block diagram of a primary terminal having a different configuration from primary terminal 100 disclosed in the present invention. In Figure 4, 400 represents the main body of the primary terminal. 401 represents an input terminal that inputs video signals sent from a relay station. 402 represents an output terminal that outputs charging information. 403 represents an output terminal that outputs video signals processed to prevent improper reception. 411 represents a demodulating circuit that demodulates the video signals input from input terminal 401. 412 represents a separating circuit that separates the header part having the program information or the like from the demodulated video signals. 413 represents an error checker that confirms whether the video data sent from the relay station are properly received. 414 represents a charger that forms charging information corresponding to the program information output from the separating circuit and the reception status confirmed by the error checker. 415 represents an encoding circuit that compressively encodes the received video signals. 416 represents a memory that stores an intrinsic terminal identification code of an identification terminal or the subscriber who possesses the terminal. 417 represents a scrambler that scrambles the key signal needed for decoding output from encoding circuit 415 and superimposes it with the terminal identification code. 418 represents a multiplexing circuit that multiplexes the compressed video data output from encoding circuit 415 with the key information output from scrambler 417 on the time axis.

[0040]

The primary terminal 400 shown in Figure 4 is a configuration example of a primary terminal in the case of processing video signals that are transmitted from a relay station and that have not received compressing encoding or other processing. In this case, the program information used for charging the subscriber and the signal for error check are also needed. Said information, however, can be inserted by providing a special timing space. In this case, said information can be inserted during the horizontal or vertical scanning period of the video signals.

[0041]

As shown in Figure 4, the video signals transmitted from the relay station are inputted into input terminal 401. The program information inserted into the vertical scanning period or the like is separated in separating circuit 411. The video signals are outputted to error checker 413, and the charging information is outputted to charger 414. Error checker 413 checks whether there is error in the received video signals and outputs the result to charger 414. The error checking is, for example, carried out by inserting a specific signal every horizontal or vertical scanning period, checking the known specific signal in error checker 413 to confirm the absence/presence of the specific signal or by inserting parity in the horizontal scanning period.

[0042]

Charger 414 forms the charging information in the same way as described in the first application example and outputs it from output terminal 402 to the relay station. On the other hand, the video signals are input into encoding circuit 415, wherein they are compressively encoded. After that, the compressed video data are output to the multiplexing circuit, and the key signal needed for decoding the compressed video data is output to scrambler 417. The decoding key is input from encoding circuit 415 into scrambler 417, and the terminal identification code is input from memory 416 into the scrambler. The two signals are superimposed to perform scrambling. The terminal identification code is the same as that used in the aforementioned first application example. Multiplexing circuit 418 multiplexes the compressed video data output from encoding circuit 415 with the key information output from scrambler 417 on the time axis and outputs the result from output terminal 403. The configuration and function of the secondary terminal are the same as those described in the first application example and will not be explained again.

[0043]

By adopting the configuration described in the aforementioned second application example, even if the video signals transmitted from a relay station are not compressively

encoded, it is still possible to charge the subscriber and prevent improper reception by a third party. Even if the video signals transmitted from the relay station are analog signals, it is possible to handle these signals by adding a tuner immediately before demodulating circuit 411 and adding an A/D converter immediately after demodulating circuit 411 or immediately before encoding circuit 415.

[0044]

In the following, yet another application example of the present invention will be explained based on Figure 5.

[0045]

In Figure 5, 550 represents the main body of the secondary terminal in the present invention. 551 represents an input terminal to which the output of the primary terminal is directly input or the signals are input via a VTR or other video signal recording/reproducing device. 552 represents an output terminal that outputs the decoded program pictures to a monitor. 561 represents an extracting circuit that extracts the key information from the input video signals. 562 represents a descrambler that removes the scrambling of the key information extracted by extracting circuit 561 and separates the key signal used for decoding the compressed video signals from the terminal identification code. 563 represents a memory that prestores the terminal identification code. 564 represents a comparator that compares the terminal identification code separated by descrambler 562 with the terminal identification code stored in memory 563. 565 represents a switch that receives input of the decoding key from descrambler 562 and controls its output corresponding to the output of comparator 564. 566 represents a decoding circuit that uses the decoding key output from switch 565 to decode the compressed video signals. 567 represents a D/A converter. 568 represents a copy guard circuit that performs a signal processing on the video signals output from output terminal 552 in such a way that they cannot be recorded on a VTR or other video signal recording/reproducing device. 570 represents a monitor that displays the video signals output from secondary terminal 550.

[0046]

Since 561-567 operate in the same way as 161-167 shown in Figure 1(B), these circuits will not be explained again.

[0047]

In Figure 5, the signals obtained by time-axis multiplexing the compressed video data with the key information and output from the primary terminal shown in Figure 1(A) or 4 are

directly input into the input terminal 551 of secondary terminal 550. It is also possible to input the aforementioned signals via a VTR or a video signal recording/reproducing device into the aforementioned input terminal. The input signals are processed in extracting circuit 561, descrambler 562, memory 563, comparator 564, switch 565, decoding circuit 566, and D/A converter 567 in the same way as in 161-167 shown in Figure 1. That is, the signals are output after the terminal identification code on the side of the primary terminal is confirmed and the compressed video signals are decoded and then converted into analog signals. The analog video signals output from D/A converter 567 are input into copy guard circuit 568. In the copy guard circuit, the synchronization signal part of the video signal is processed, and then the video signals are output from output terminal 552. That is, the secondary terminal having the circuit configuration disclosed in this application example has a commercially available monitor on the outside as the device for displaying the program picture. Therefore, it is necessary to carry out a signal processing to prevent improper reception between the output terminal 552 and monitor 570 of the secondary terminal. In this case, since there is no need to record in a VTR or other video signal recording/reproducing device, it is possible to display the pictures by using the monitor in copy guard circuit 568. However, the synchronization part of the video signal is changed such that recording in a VTR or the like is impossible, that is, the signals are not synchronized in a VTR or the like although they are synchronized in the monitor.

[0048]

By adopting the circuit configuration disclosed in this application example, in addition to the same effects as those described in the aforementioned application example, it is also possible to use the existing TV monitor or another device as the display device for the program pictures.

[0049]

Figure 7 shows yet another application example of the present invention.

[0050]

Figure 7 shows a configuration example in the case of using one special reception terminal instead of dividing the terminal into a primary side and a secondary side. In this figure, 700 represents a special terminal that receives the programs distributed from a relay station. 701 represents an input terminal that inputs the video signals sent from the relay station. 702 represents an output terminal that outputs the charging information of the program subscription fee into special terminal 700. 703 represents an output terminal that outputs scrambled video signals to a VTR or other video recording/reproducing device. 704 represents an input terminal that inputs scrambled video signals from a VTR or other video signal recording/reproducing

device. 705 represents an output terminal that outputs the program picture to a monitor or other display device. 711 represents a demodulating circuit that digitally demodulates the video signals input from input terminal 701. 712 represents a separating circuit that separates the data header including the program information and the key signal needed for decoding the compressed video data from the video signals that are digitally demodulated by demodulating circuit 711. 713 represents an error checker used for confirming whether the video signals transmitted from the relay station are correctly received. 714 represents a charger that forms the charging information of the program subscription fee based on the program information separated by separating circuit 712 and the result of reception checking performed by error checker 713. 715 represents a memory that stores an intrinsic terminal identification code that can be used to identify special terminal 700 or the subscriber who possesses special terminal 700. 716 represents a scrambler that performs encryption by superimposing the key signal separated by separating circuit 712 with the terminal identification code stored in memory 715. 717 represents a multiplexing circuit that multiplexes the compressed video data output from error checker 713 with the key information output from scrambler 716 on the time axis. 721 represents an extracting circuit that extracts the key information from the video signals input from input terminal 704. 722 represents a descrambler that removes the scramble of the key information extracted by extracting circuit 721 and separates the key signal used for decoding the compressed video signals and the terminal identification code. 723 represents a comparator that compares the terminal identification code separated by descrambler 722 with the terminal identification code stored in memory 715. 724 represents a switch that receives the input of the decoding key from descrambler 722 and controls its output corresponding to the output of comparator 723. 725 represents a first selector that receives the compressed video data output from error checker 713 and the compressed video data output from extracting circuit 721 and selectively outputs one of them. 726 represents a second selector that receives the decoding key output from separating circuit 712 and the decoding key output from switch 724 and selectively outputs one of them. 727 represents a decoding circuit that uses the decoding key output from the second selector 726 to decode the compressed video data output from the first selector. 728 represents a D/A converter. 729 represents a copy guard circuit that performs a signal processing on the video signals output from output terminal 705 in such a way that they cannot be recorded on a VTR or other video signal recording/reproducing device. 750 represents a video signal recording/reproducing device that can store video signals, such as a VTR, magneto-optical disc, or hard disk. 760 represents a monitor that displays the video signals output from special terminal 700. In this figure 711-717 operate in the same way as 111-117 shown in Figure 1. 721-724, 727-729 operate in the same way as 561, 562, 564-568 shown in Figure 5.

[0051]

In this figure, the video signals sent from relay station 620 shown in Figure 6 via cable 630 are input from the input terminal 701 of special reception terminal 700. In demodulating circuit 711, separating circuit 712, error checker 713, and charger 714, digital demodulation, separation of the program information and the decoding key, confirmation of the presence/absence of transmission error, and formation of charging information are carried out, respectively. These operations will not be explained again since they are the same as those of the circuits having the corresponding numbers in the first application example shown in Figure 1.

[0052]

The compressed video data output from error checker 713 are output to multiplexing circuit 717 and the first selector 725. The decoding key output from separating circuit 712 is output to scrambler 16 and the second selector 726.

[0053]

The decoding key input into scrambler 716 and the compressed video data input into multiplexing circuit 717 are multiplexed with the terminal identification number and the decoding key stored in memory 715 in said scrambler 716 and further time-axis multiplexed with the compressed video data in multiplexing circuit 717. The processing in scrambler 716 and multiplexing circuit 717 is also the same as that in the first application example and will not be explained again. The aforementioned compressed video data multiplexed with the decoding information are output from output terminal 703 and are input into video signal recording/reproducing device 750, wherein the video signals can be recorded and stored in a storage medium.

[0054]

The signals output from video signal recording/reproducing device 750 are input from input terminal 704. First, the key information is extracted in extracting circuit 721 and output to descrambler 722, and the compressed video data are output to the first selector 725. After the key information input to descrambler 722 is descrambled in the same way as explained in Figure 5, the decoding key is separated from the terminal identification code. The terminal identification code is compared with the content stored in memory 715 in comparator 723. On the other hand, the decoding key is input into switch 724, and its output is controlled depending on the output of comparator 723. Its output is input into the second selector 726.

[0055]

The first selector 725 constantly interacts with the second selector 726. That is, when the first selector 725 selects and outputs the output of error checker 713, the decoding key output from separating circuit 712 is selected and output from the second selector 726. On the other hand, if the output of extracting circuit 721 is selected and output in the first selector, the second selector 726 selects and outputs the decoding key output from switch 724. That is, when any video signal recording/reproducing device is connected outside special reception terminal 700 and the video signal data are input from input terminal 704, the two selectors 725, 726 select and output the compressed video data and the decoding key reproduced from the external video signal recording/reproducing device. Otherwise, the two selectors 725, 726 select the compressed video data and the decoding key output from error checker 713 and separating circuit 712, respectively.

[0056]

The compressed video data output from the first selector 725 are decoded in decoding circuit 727 using the decoding key output from the second selector 726. The processing carried out in D/A converter 728 and copy guard circuit 729 is the same as that explained in Figure 5 and will not be explained again.

[0057]

Although the reception terminal has the configuration explained by using the aforementioned application example, it has the same effect as the other application examples described above. That is, it is possible to charge a subscription fee corresponding to the program reception status to the subscriber and prevent improper reception by a third party. Also, by adopting the configuration of this application example, it is satisfactory to use one memory that stores the terminal identification code prepared in the reception terminal. In addition, there is no need to divide the reception terminal into a primary terminal and a secondary terminal so setup space can be saved. In particular, the wiring and cable between primary and secondary terminals become unnecessary to the subscribers who do not use a VTR or other video signal recording/reproducing device.

[0058]

All of the aforementioned application examples explain a case in which programs distributed from relay stations are transmitted using communication cables. The present invention, however, is not limited to a telephone line or other cables but is also applicable to a terrestrial broadcast, satellite broadcast, analog broadcast, and digital broadcast.

[0059]

The data structure of the video signal shown in Figure 2 is only an example. The video signals may have other structures. Although the video signals transmitted from a relay station must have a parity part and a data header part including the program information, the parity part can be omitted if an error free transmission path is used. It is also possible to adopt the signal structure of the current broadcasting system if the only purpose is to prevent improper reception without considering charging a subscription fee. There are no other limitations on the structure of the data transmitted between the primary and secondary terminals shown in Figure 3 as long as appropriate key information is inserted between the compressed video data. The video data between the primary and secondary terminals are not necessarily compressed data. If data compression is not adopted, in order to prevent improper reception, it is necessary to scramble the video data using a method other than data compression.

[0060] [amended]

Effect of the invention

According to the present invention, when information is output after undergoing copy guard processing, it is possible to prevent copying of the program recording medium using a VTR or other video signal recording/reproducing device and the accompanying improper reception by a third party. Therefore, the benefits of the program distribution companies and the copyrights of the programs can be protected.

[0061]

[deleted by amendment]

Brief description of the figures

Figure 1 is the block diagram of a video signal reception terminal explaining the first application example of the present invention.

Figure 2 is a diagram illustrating an example of the data structure of the video signals sent from a program relay station in the application example of the present invention.

Figure 3 is a diagram illustrating an example of the data structure of the video signals transmitted between the primary and secondary terminals in the application example of the present invention.

Figure 4 is the block diagram of the primary terminal used for explaining the second application example of the present invention.

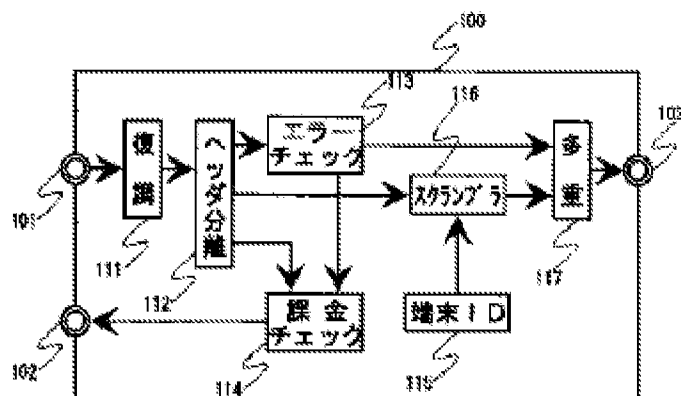
Figure 5 is the block diagram of the secondary terminal used for explaining the third application example of the present invention.

Figure 6 is a diagram explaining a cable broadcasting system.

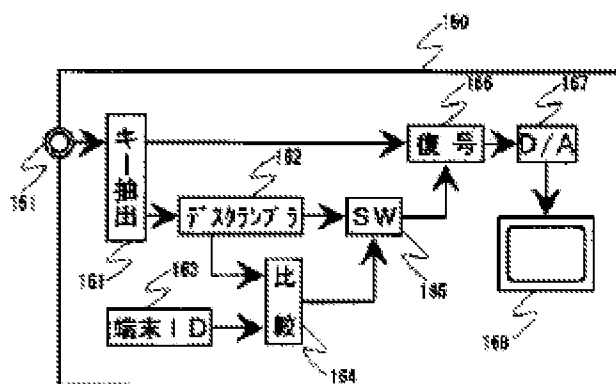
Figure 7 is the block diagram of a video signal reception terminal explaining the fourth application example of the present invention.

Explanation of symbols

100	Primary terminal
112	Separating circuit
113	Error checker
114	Charger
115, 163	Memory
116	Scrambler
117	Multiplexing circuit
150	Secondary terminal
161	Extracting circuit
162	Descrambler
164	Comparator
165	Switch
166	Decoding circuit
168	Monitor



(A)



(B)

Figure 1

Key:	111	Demodulate
	112	Separate header
	113	Check error
	114	Check charging
	115	Terminal ID
	116	Scrambler
	103	Multiplex
	161	Extract key
	162	Descrambler
	163	Terminal ID
	164	Compare
	166	Decode



Figure 2

Key: 200 Header
 211 Compressed data
 212 Compressed data
 213 Compressed data
 221 Parity
 222 Parity

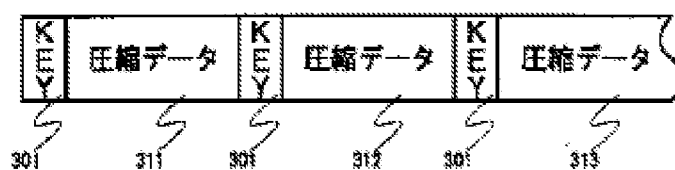


Figure 3

Key: 311 Compressed data
 312 Compressed data
 313 Compressed data

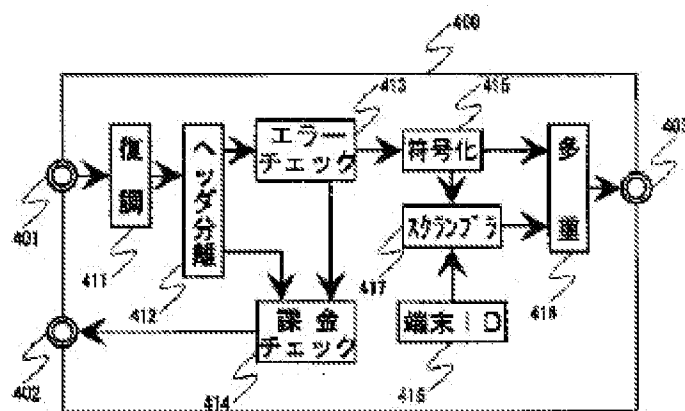


Figure 4

Key: 411 Demodulate
 412 Separate the header
 413 Error check
 414 Check charging
 415 Encode

416 Terminal ID
 417 Scrambler
 418 Multiplex

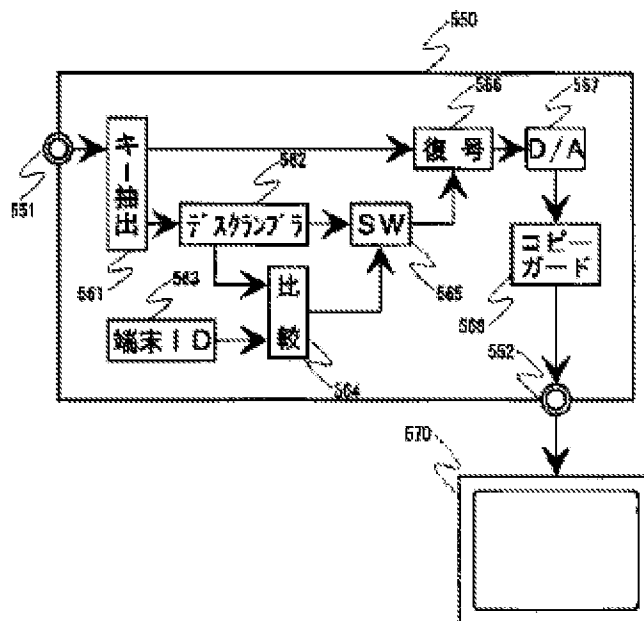


Figure 5

Key: 561 Extract key
 562 Descrambler
 563 Terminal ID
 564 Compare
 566 Decode
 568 Copy guard

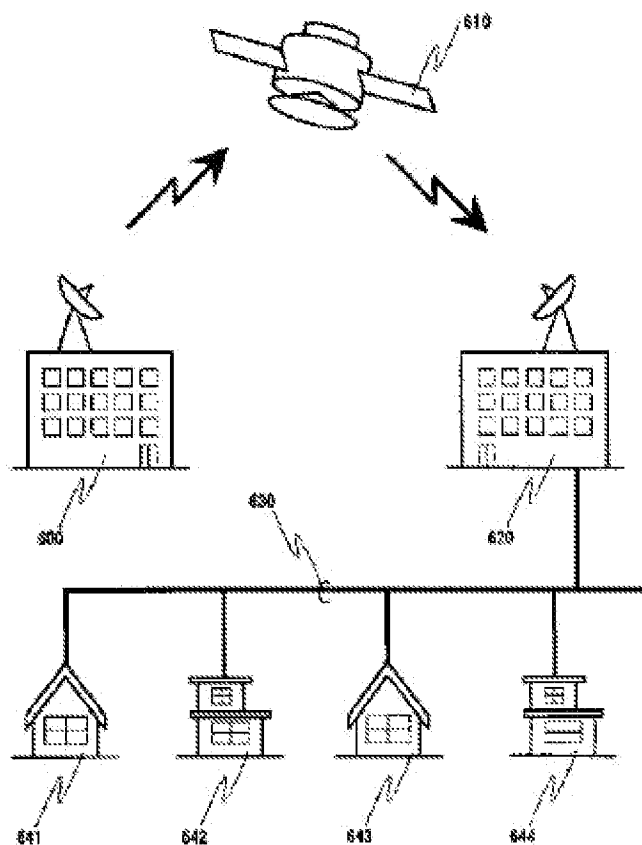


Figure 6

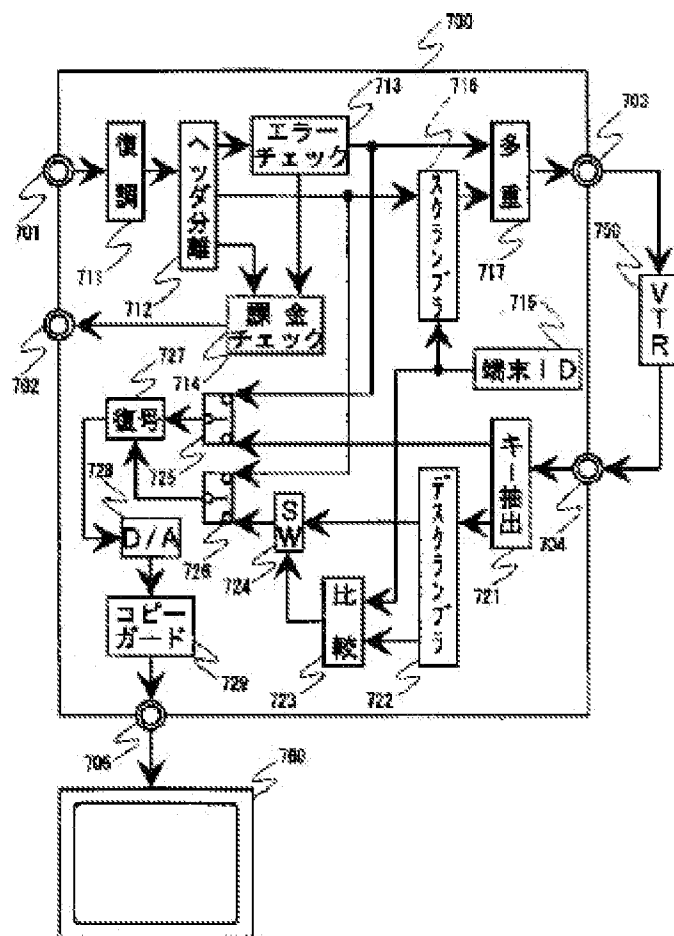


Figure 7

Key:	711	Demodulate
	712	Separate the header
	713	Error check
	714	Check charging
	715	Terminal ID
	716	Scrambler
	717	Multiplex
	721	Extract the key
	722	Descrambler
	723	Compare
	727	Decode
	729	Copy guard

Continued from front page

F Terms (reference)	50063	AA01	AB03	AB07	AC01	AC05	AC10	CA12	CA23	CA36	DA07
		DA13	DB10								
	50064	BA01	BB01	BB02	BC01	BC06	BC17	BC18	BC22	BC23	BC25
		BD02	BD04	BD08	BD09	BD13					
	50104	BA04	PA05	PA10	PA11						